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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,825	01/15/2004	CHENG-YI LIU	10786-US-PA	1824
31561	7590	06/07/2006	EXAMINER	
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN			GRAYBILL, DAVID E	
			ART UNIT	PAPER NUMBER
			2822	
DATE MAILED: 06/07/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/707,825	Applicant(s) LIU ET AL.	
	Examiner David E. Graybill	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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Applicant's election of Group I, claims 1-9, in the reply filed on 7-13-5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

In the rejections infra, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 4-6 and 9 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Yoda (20020061641).

At paragraphs 73, 78, 96-98, 108, 113-116 and claim 16, Yoda discloses the following:

A flip-chip gold bump structure for bonding with a copper-containing solder material, the gold bump structure being formed on a wafer 10, the structure comprising: at least one gold bump 40; and an inherent reaction barrier layer 42 on the gold bump, wherein the reaction barrier layer

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comprising a copper layer 42 inherently disposed on the nickel layer;
wherein the gold bump has a height from about 3 μm to about 150 μm .

A flip-chip package structure adapted to connect a chip and a chip substrate, the structure comprising: at least one gold bump on the chip 18; a nickel layer on the gold bump; and a solder containing copper 42 on the nickel layer for connecting the chip and the chip substrate; wherein the solder containing copper includes a solder alloy; wherein the gold bump has a height from about 3 μm to about 150 μm .

To further clarify the disclosure of the particular claimed layer arrangement, it is noted that Yoda discloses that the particular claimed materials are arranged in any order; therefore, the scope of the disclosure encompasses the particular claimed order.

Also, to further clarify, Yoda discloses a solder containing copper because Yoda discloses "copper tin" and, "a metal including tin and at least one selected from Ag, Cu," and these materials are solder because they are metallic alloys that can be used when melted to join metallic surfaces.

Also, Yoda discloses a reaction barrier layer because the term "reaction barrier" merely limits the scope of the layer to the intended use of the layer and does not appear to result in a structural difference between the claimed layer and the layer of the applied prior art. Further, because the layer of

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Yoda appears to have the same structure as the claimed layer, it appears to be capable of being used for the intended use, and the intended use does not patentably distinguish the claimed layer from the layer of Yoda. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim."; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, "Inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims."; In re Young, 25 USPQ 69 (CCPA 1935) (as restated in In re Otto, 136 USPQ 458, 459 (CCPA 1963)). And, claims directed to product must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does [or is intended to do]." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

To further clarify, the copper layer is inherently disposed on the nickel layer because it is inherently put in place on (positioned in contact with the

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outer surface and/or in close proximity with and/or in a direction or location with respect to) the nickel layer. In any case, the product of Yoda inherently possesses any structural characteristics imparted by the process limitation "disposed." See *In re Fitzgerald, Sanders, and Bagheri*, 205 USPQ 594 (CCPA 1980).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoda (20020061641).

Yoda is applied for the same reasons it is applied supra.

However, Yoda does not appear to explicitly disclose the particular claimed copper concentration.

Regardless, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed copper concentration because applicant has not disclosed that, in view of the

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applied prior art, the concentration is for a particular unobvious purpose, produce an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another concentration. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or

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other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’ In *re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.”

Also, Yoda does not appear to explicitly disclose the particular claimed layer thicknesses.

Still, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular thicknesses because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using other thicknesses. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338,

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220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoda (20020061641).

Yoda is applied as it is applied to claims 1-9 supra.

Although, as elucidated in the rejection supra, Yoda explicitly discloses a gold bump 40, Yoda does not appear to explicitly disclose the particular claimed layer arrangement.

Nonetheless, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to arrange the layers of Yoda as claimed because applicant has not disclosed that, in view of the applied prior art, the arrangement is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another arrangement. Moreover, it has been held that limitations directed to rearrangement of parts are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. In re Japikse 86 USPQ 70 (CCPA 1950); for example, reversal of parts was held to have been obvious. In re Gazda 104 USPQ 400 (CCPA 1955).

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Moreover, "simple adjustment of spatial orientation" has been held to be obvious. *Colt Industries Operating Corp. v. Index Werke, K.G. et al.*, 217 USPQ 1176 (DC 1982).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoda as applied to claim 7 *supra*, and further in combination with Amagai (6762506).

Yoda does not appear to explicitly disclose the particular claimed copper concentration.

Nevertheless, at column 2, lines 9-16; column 3, lines 5-12; column 4, line 66 to column 5, line 2; and column 53 to column 7, line 5, Amagai discloses this copper concentration. Moreover, it would have been obvious to combine this disclosure with the disclosure of Yoda because it would improve the layer reliability.

Applicant's amendment and remarks filed 3-17-5 have been fully considered, are addressed by the rejections *supra*, and are further addressed *infra*.

Applicant predicates numerous arguments on the assertion, "The prior art specifies . . . the lowest layer is formed of nickel."

This assertion is respectfully traversed because, as elucidated *supra*, at column 5, paragraph 96, Yoda explicitly discloses that the lowest layer 40

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is gold, "the first metal layer 40 may be formed from one or a plurality of nickel, gold and copper."

Applicant states, "the Office concedes that Yoda fails to teach the specific concentrations (thicknesses) or the specific order for the various metal layers."

This statement is respectfully traversed because it is instead maintained in the rejection that Yoda does not appear to explicitly disclose the particular claimed copper concentration, the particular claimed layer thicknesses, and the particular claimed layer arrangement.

Also, applicant contends that, "forming the nickel layer or Cu/Ni bi-layer on the gold bump," is a critical limitation because it produces unexpected results. This contention is respectfully deemed unpersuasive because criticality must be established by factual evidence, and not, as here, by mere argument. See, for example, *In re De Blauwe*, 736 F.2d 699, 222 USPQ 191, 196 (Fed. Cir. 1984), and MPEP 716.02(d), "Demonstrating Criticality of a Claimed Range." To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). To this end, the arguments of counsel cannot take the place of evidence in the record. *In re Schulze*,

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346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965). Instead, the evidence relied on should establish "that the differences in results are in fact unexpected and unobvious and of both statistical and practical significance." Ex parte Gelles, 22 USPQ2d 1318, 1319 (Bd. Pat. App. & Inter. 1992). See also, Ex parte C, 27 USPQ2d 1492 (Bd. Pat. App. & Inter. 1992); In re Nolan, 553 F.2d 1261, 193 USPQ 641, 645 (CCPA 1977); and In re Eli Lilly, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

For information on the status of this application applicant should check PAIR: Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be

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obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.
The fax phone number for group 2800 is (571) 273-8300.



David E. Graybill
Primary Examiner
Art Unit 2822

D.G.
26-May-06